KGS Research Response to the July 2022 Flooding in Eastern Kentucky

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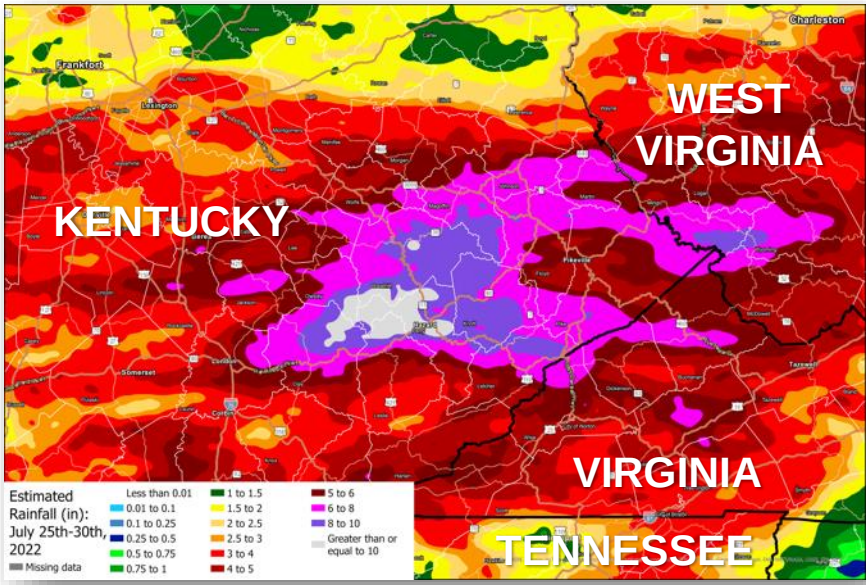
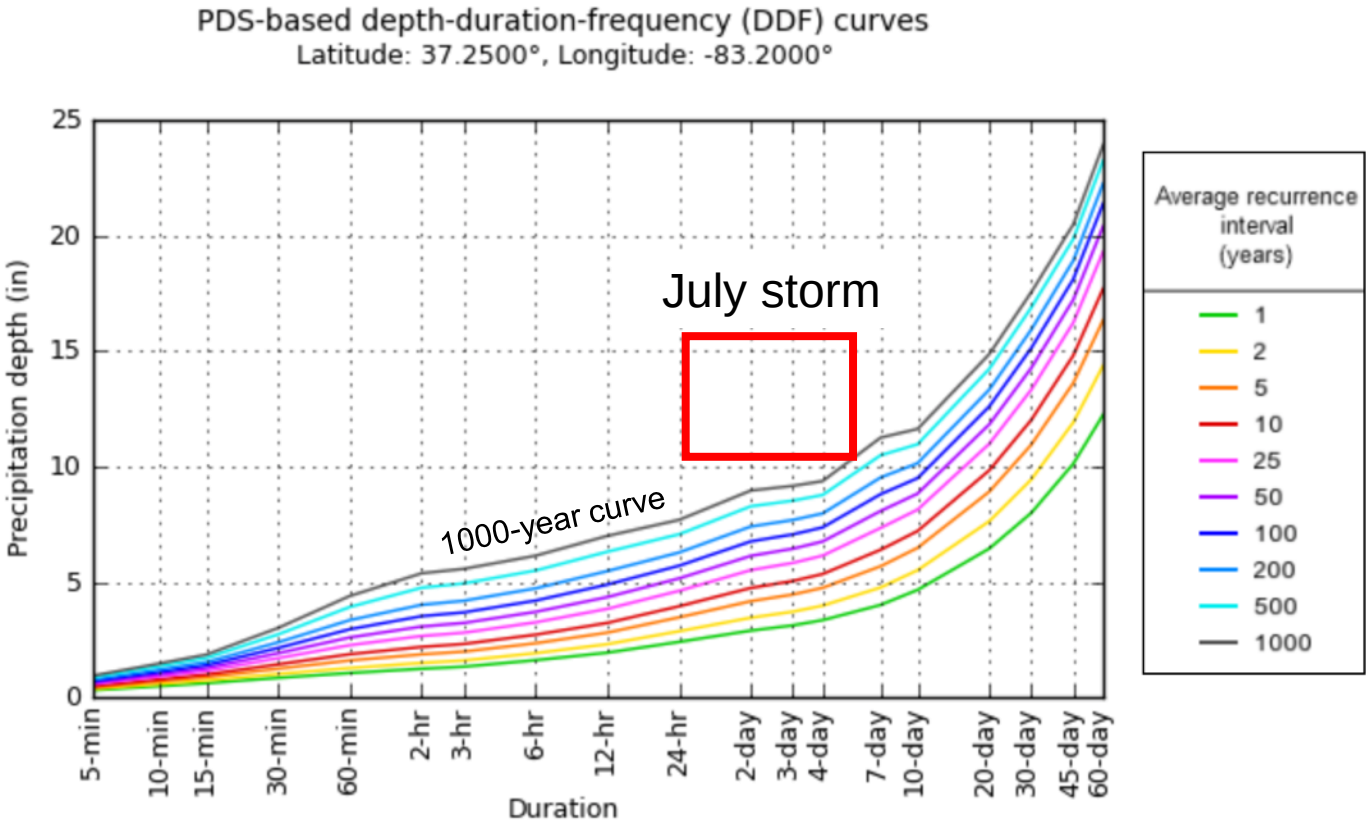
Summary of the disaster

- > 14” to 16” of rain over a narrow swath of eastern Kentucky during July 25 – 30
  - Heaviest rain July 27 through July 28
- 13.2” over two days at Carr Creek Lake
- North Fork of Kentucky River at Whitesburg peaked at 22’ (previous record 14.7’ in 1957)
- North Fork of Kentucky River at Jackson peaked at 43.5’ (previous record 43.1’ in 1939) and **rose 35’ overnight**
- 39 deaths, 600 helicopter rescues, uncounted swift-water rescues
- 24 media interview requests

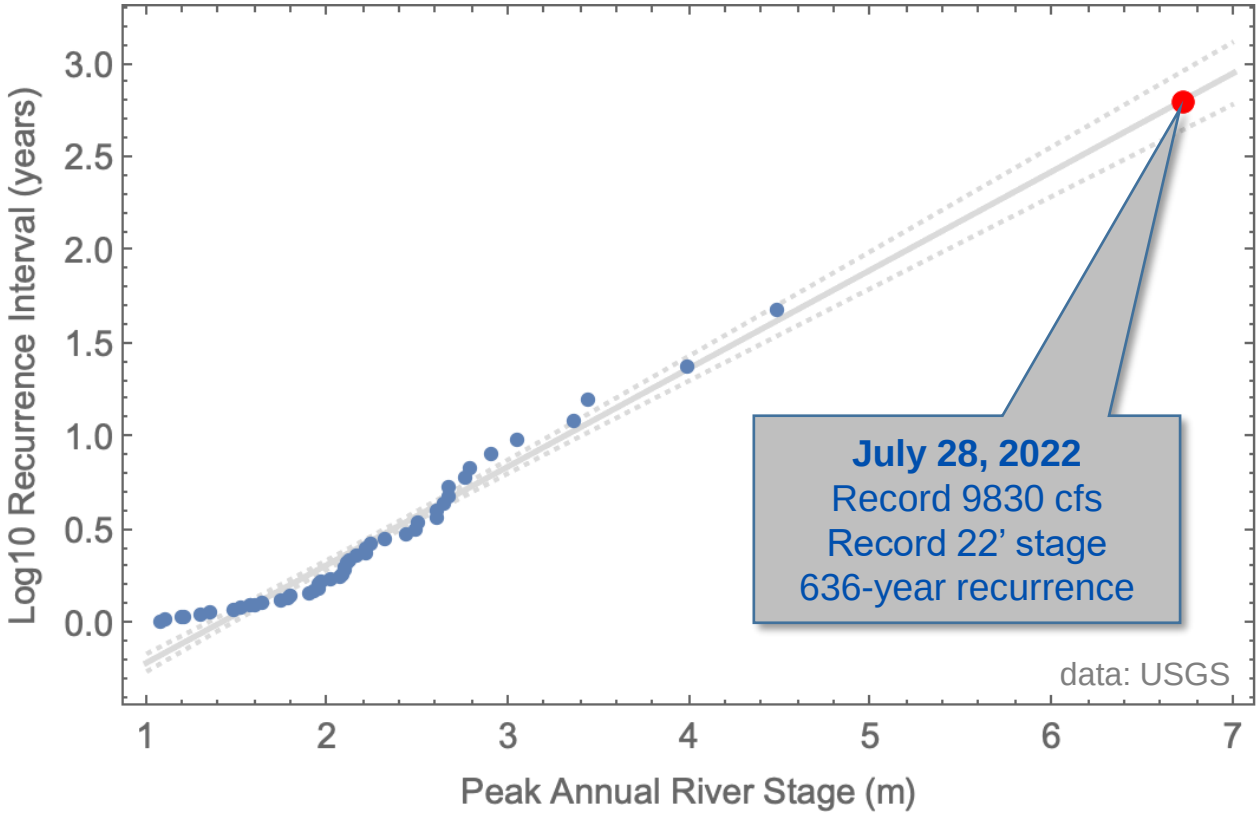


Source: National Weather Service

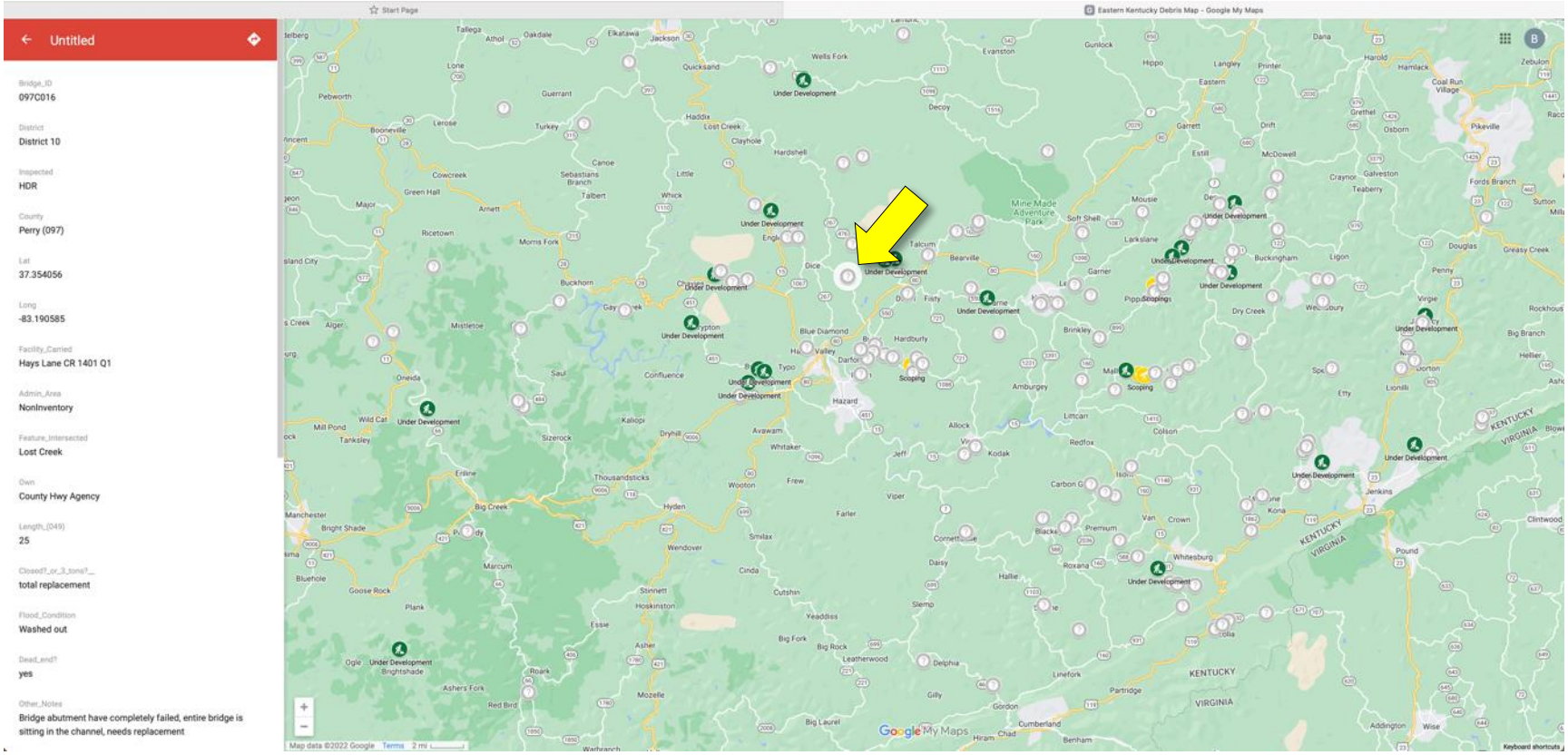
NOAA DDF curves for Hazard, Kentucky



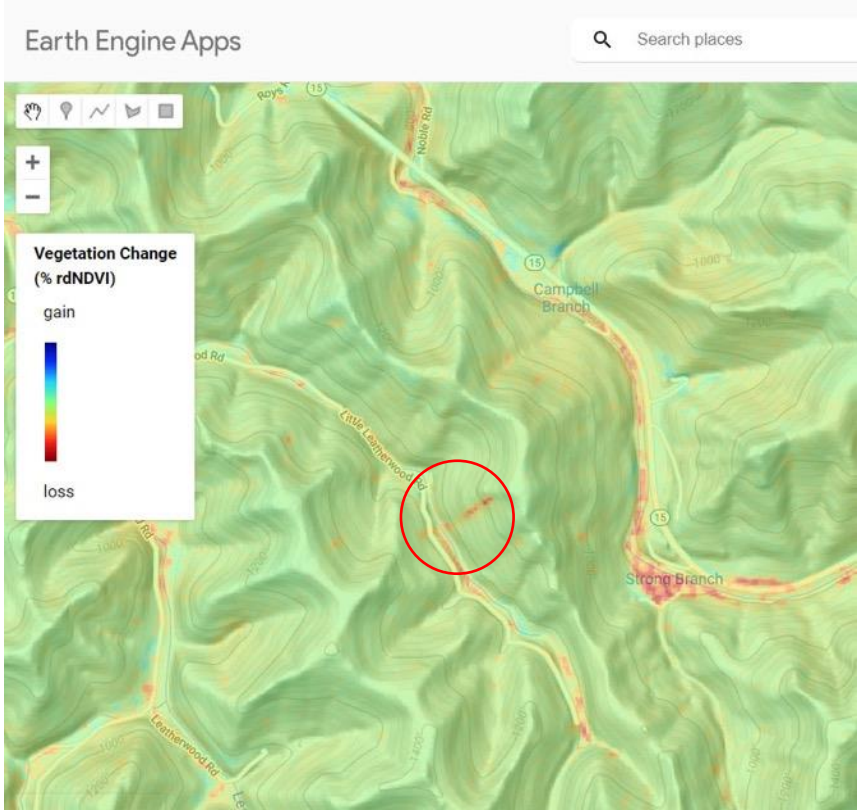
North Fork Kentucky River at Whitesburg (provisional)



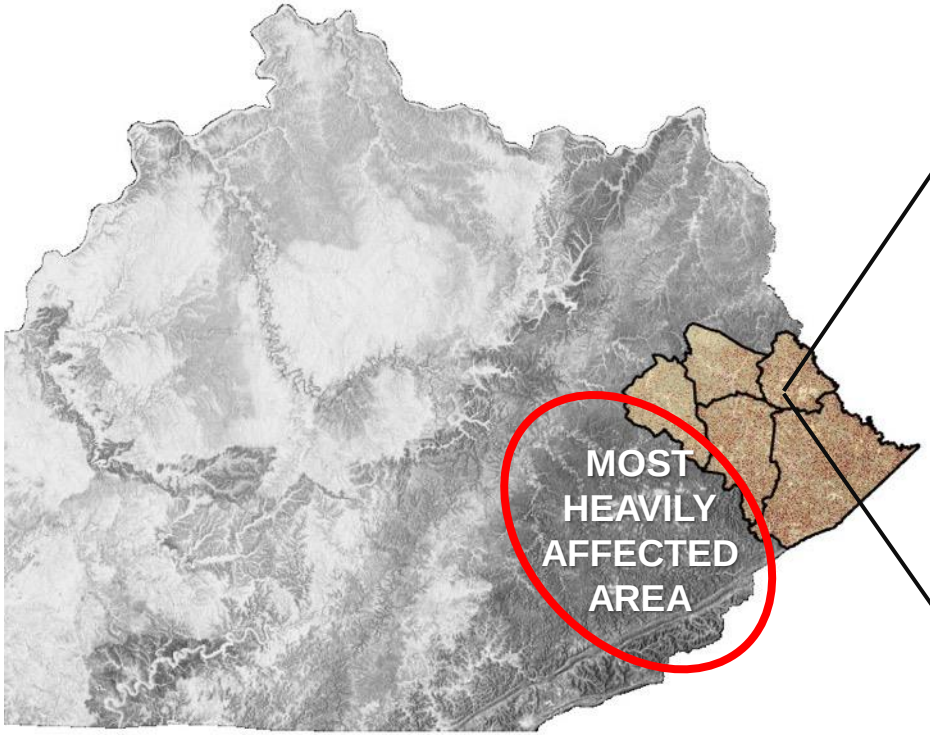
Kentucky Transportation Cabinet real-time web app



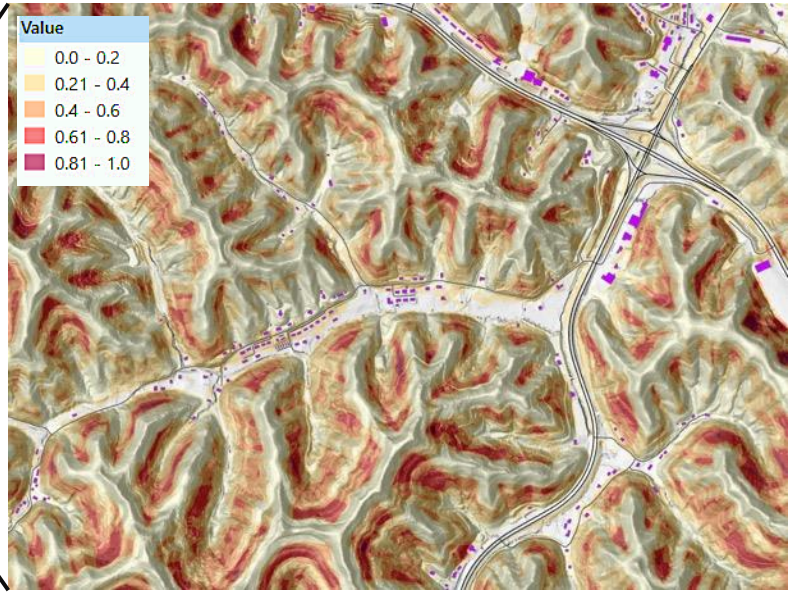
Landslide assessment using NDVI change in HazMapper



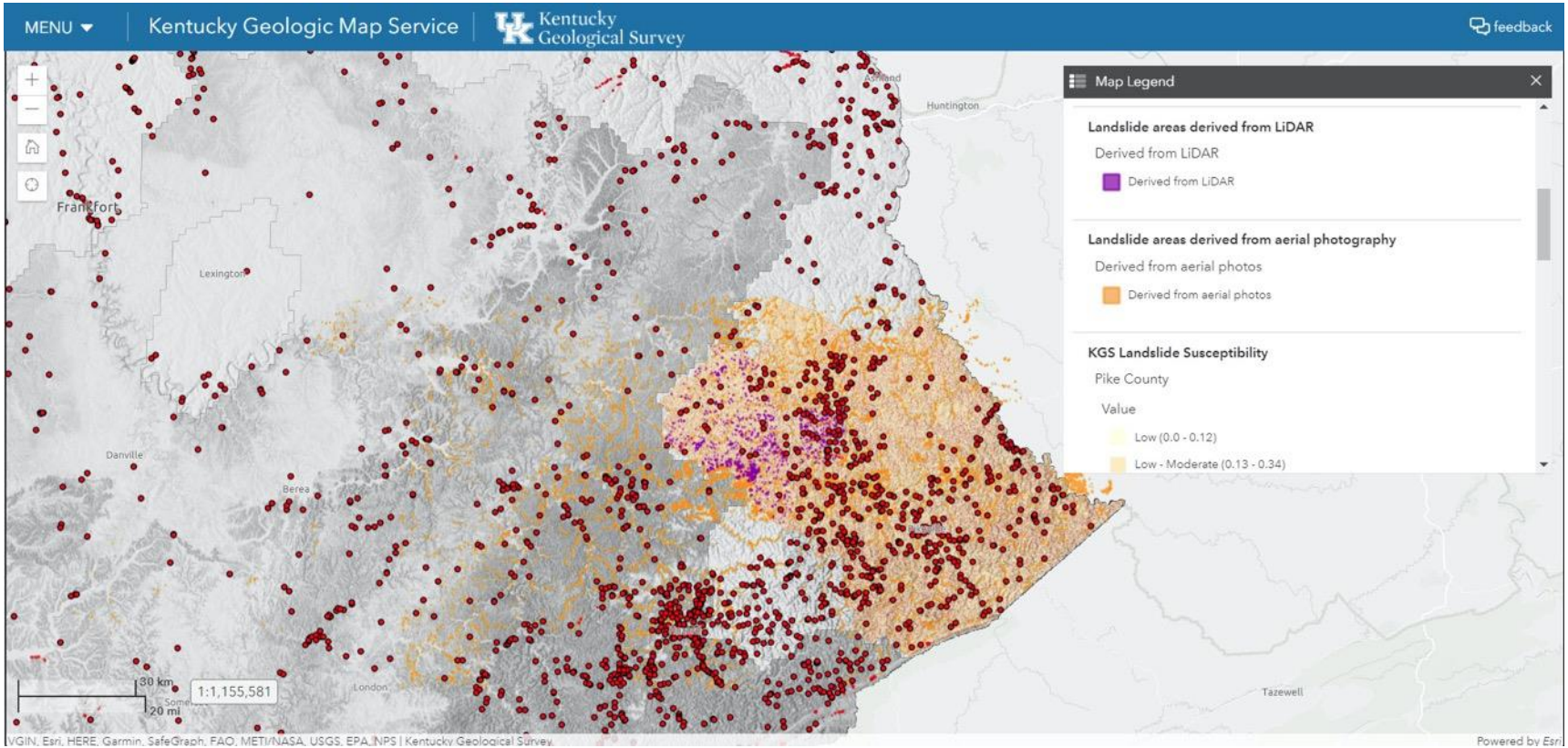
Lidar-based landslide susceptibility map test



Relative Landslide Susceptibility



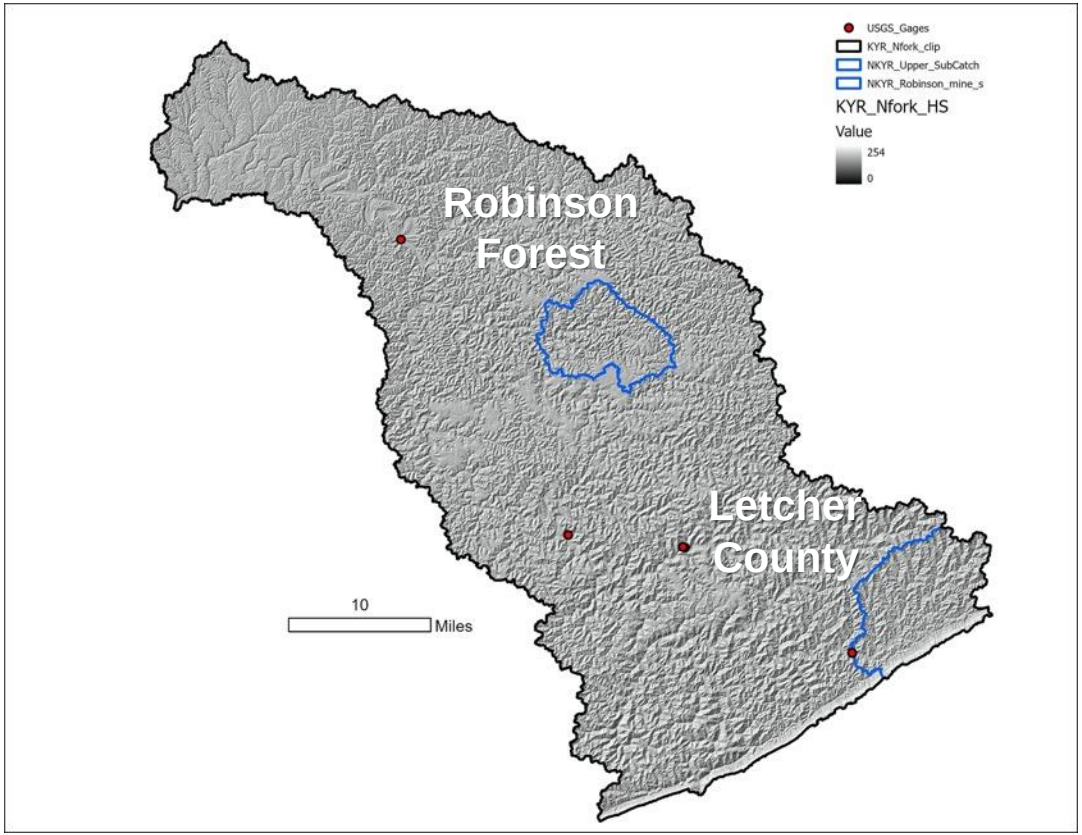
Updating the KGS landslide web service



NSF RAPID grant for perishable sample collection

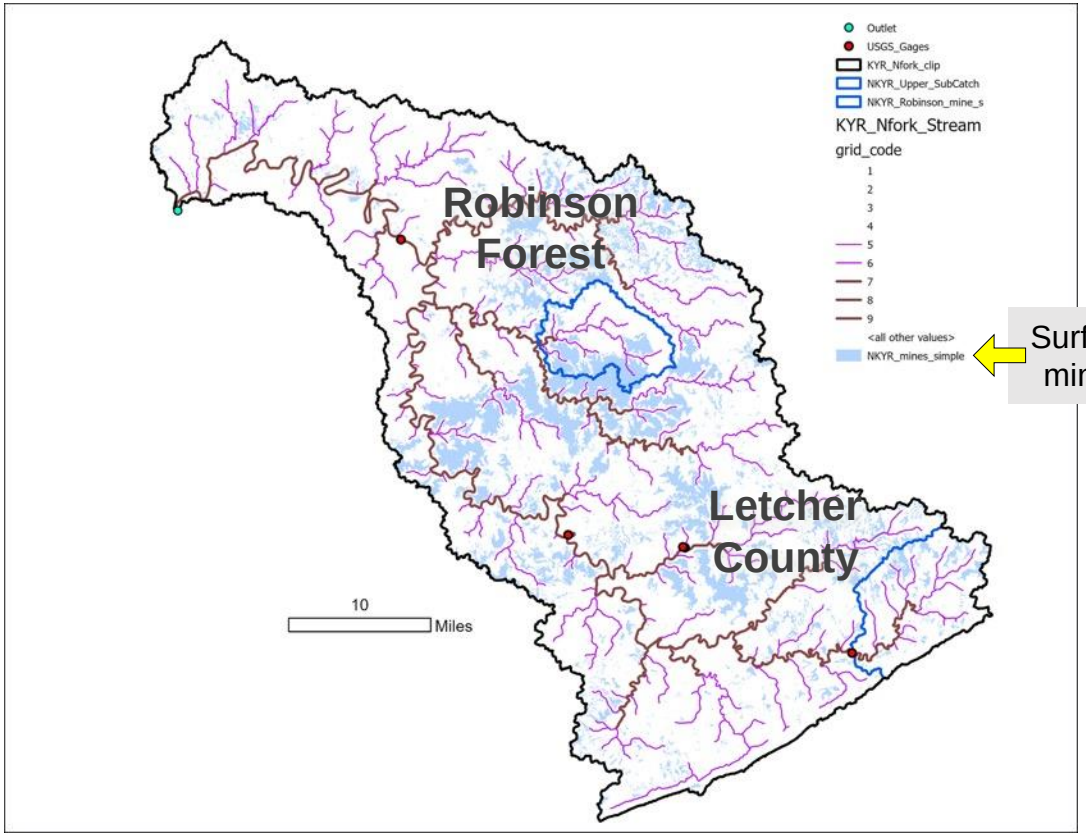
- Geologically contextualized sampling to better understand flood sediment toxicity and public health concerns
- Collect and preserve perishable data
- No analysis, modeling, or outreach
- HOWEVER, the data need to be collected in the context of a future investigation
- NSF expects a follow up standard grant proposal to undertake analysis of data collected

NSF RAPID grant research plan



- 5 USGS stream gages
- Focus on two sub-catchments
- Robinson Forest—with large area of mountain top removal mining—facilitates a paired watershed test
- Letcher County watershed also has mined areas and good access

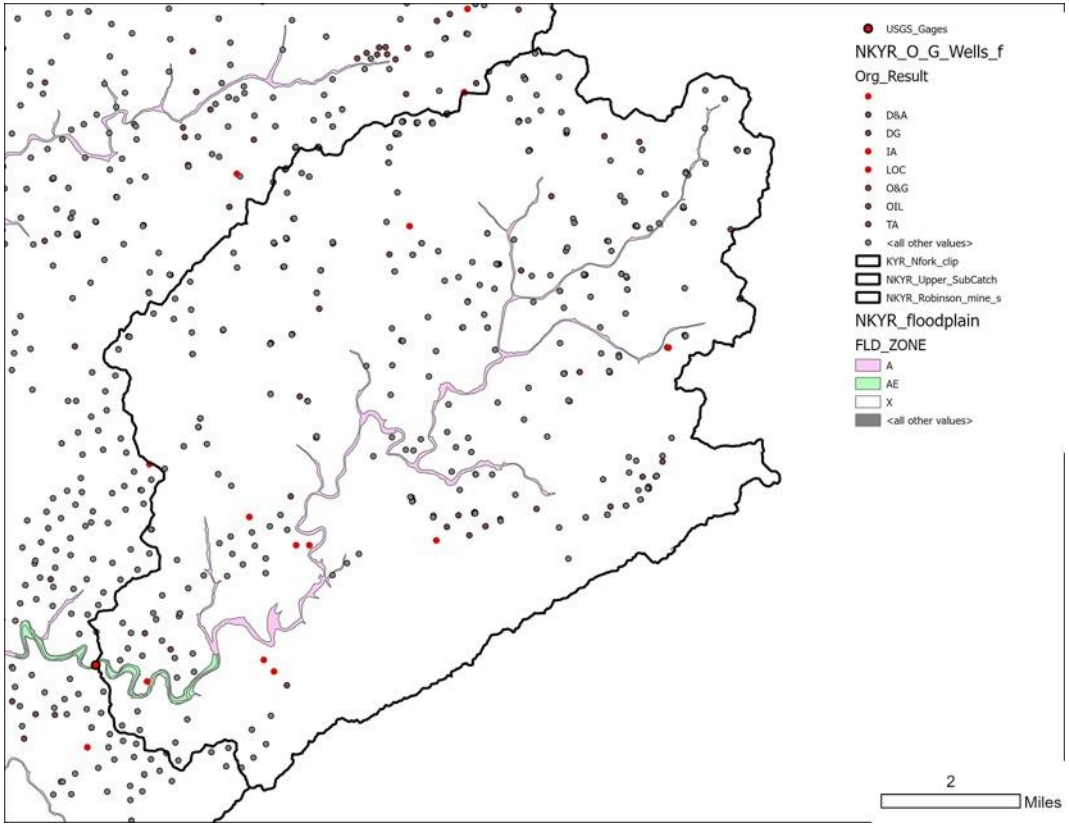
NSF RAPID grant research plan



Surface mines

- Inventory flood deposits, debris flows, scoured channels, high water marks
- Limited mapping of debris flow and landslide deposits for context on why/how events initiated
- Water and sediment samples at accessible locations

Another twist…Kentucky's 14,000 to 30,000* orphan wells



Many wells in both study areas

- Most are unlikely to be leaking contaminants
- Red dots are exceptions
- Inappropriately abandoned (IA) and old with poor records (LOC)
- Do orphan wells pose public health/safety risks in flooded areas?